

In the Claims

1. (Original)

A method of manufacturing a fill nipple for a fuel tank, comprising the steps of:

providing a multi-layer preform of material including an inner layer of material, an intermediate layer of material, and an outer layer of material with the intermediate layer of material having a different composition than the inner and outer layers of material and adapted to resist permeation of hydrocarbon fuel vapors therethrough;

molding the preform to form an annular body having an outer surface and an inner surface that defines a passage extending between a pair of generally opposed ends of the body with the inner layer of material defining the inner surface of the body and the outer layer of material defining the outer surface of the body and the intermediate layer of material forming a barrier layer to fuel vapor.

2. (Original)

The method of claim 1 wherein said molding step includes providing a male mold half having a cylindrical plug, and a female mold half having a cylindrical cavity adapted to receive the plug with the preform between them, heating the preform, and closing the mold halves together to form the heated preform about the plug.

3. (Original)

The method of claim 2 wherein said molding step further includes before the step of closing the mold halves together, the steps of disposing the preform on the male mold

half and providing a vacuum between the male mold half and the preform to form the preform on the male mold half.

4. (Original)

The method of claim 3 wherein said molding step further includes after the step of closing the mold halves together, the steps of discontinuing the vacuum between the male mold half and the preform, and providing a vacuum between the female mold half and the preform to form the fill nipple.

5. (Original)

The method of claim 4 which also includes the step of trimming the formed preform to remove scrap material from the formed fill nipple.

6. (Original)

The method of claim 5 wherein said trimming step includes removing material closing one end of the fill nipple to provide a passage through the fill nipple.

7. (Original)

The method of claim 2 wherein said male mold half includes an annular wall surrounding and spaced from the plug, and the female mold half includes a complementary annular cavity and said parison is also formed over the annular wall when the mold halves are closed together.

8. (Original)

The method of claim 1 wherein the parison is maintained at a temperature of between 210°C - 230°C as it is molded.

9. (Currently Amended)

A fuel tank, comprising:

a shell defining an interior for holding fuel and having an opening for receiving fuel into the interior;

a fill nipple having an outer surface and an inner surface defining a passage extending between a pair of generally opposed ends of the fill nipple with one end attached to the shell with the passage aligned with the opening allowing fuel to flow through the passage and into the cavity, the fill nipple has an inner layer of material forming the inner surface of the fill nipple, an outer layer of material forming the outer surface of the fill nipple, a vapor barrier layer between the inner and outer layers, and a pair of adhesive layers with one adhesive layer disposed between the outer layer and the vapor barrier layer and the other adhesive layer disposed between the inner layer and the vapor barrier layer and;

a cover connected to the shell and the fill nipple and spanning the area of attachment of the fill nipple to the shell.

10. (Currently Amended)

The fuel tank of claim 9 wherein the cover includes a vapor barrier layer the ~~inner and outer layers are of a HDPE material.~~

11. (Currently Amended)

The fuel tank of claim 9 wherein said one end is defined in part by a radially outwardly extending flange that presents at least a portion of the inner surface for attachment to the shell **and the cover is attached to said flange.**

12. (Currently Amended)

The fuel tank of claim 11 wherein a plastic weld joint attaches the flange to the shell **and the cover overlies the weld joint.**

13. (Original)

A method of manufacturing a fuel tank, comprising the steps of:

providing a shell having an outer surface and an inner surface defining an interior for holding fuel and having an opening for receiving fuel into the interior;

constructing a fill nipple having an outer surface and an inner surface that defines a passage extending between a pair of generally opposed ends of the fill nipple and having an inner layer of material defining the inner surface of the fill nipple and an outer layer of material defining the outer surface of the fill nipple and having at least one intermediate layer of material that is different in composition from the inner and outer layers of material forming a barrier layer to fuel vapor;

disposing one of the ends of the fill nipple adjacent the outer surface of the shell and aligning the passage of the fill nipple with the opening in the shell; and

attaching the fill nipple to the shell by forming a plastic weld joint between the fill nipple and the outer surface of the shell.

14. (Original)

The method of claim 13 further comprising forming a flange extending radially outwardly from the passage on the fill nipple adjacent the end that is disposed adjacent to the shell wherein the flange presents at least a portion of the inner layer of material for attachment to the shell.

15. (Original)

The method of claim 14 further comprising heating at least the portion of the inner layer of material presented by the flange and heating at least a portion of the outer surface of the shell adjacent the opening and pressing the two heated surfaces together to form the weld joint between the fill nipple and the shell.

16. (Original)

The method of claim 13 further comprising bonding the barrier layer to the inner and outer layers of material with an adhesive layer of material.

17. (Original)

The method of claim 13 further comprising blow molding a parison of material having at least the inner, intermediate and outer layers of material to construct the fill nipple.

18. (Original)

The method of claim 13 further comprising thermoforming a laminated sheet of preformed materials having at least the inner, intermediate and outer layers of material to construct the fill nipple.

19. (Original)

A fill nipple for a fuel tank, comprising:

a body having an outer surface and an inner surface defining a passage extending between a pair of generally opposed ends of the body with one of the ends constructed for attachment adjacent a shell of the fuel tank wherein the body has an inner layer of material forming the inner surface of the fill nipple, an outer layer of material forming the outer surface of the fill nipple, a vapor barrier layer between the inner and outer layers, and a pair of adhesive layers with one adhesive layer disposed between the outer layer and the vapor barrier layer and the other adhesive layer disposed between the inner layer and the vapor barrier layer.

20. (Original)

The fill nipple of claim 19 wherein the inner and outer layers are constructed of materials having similar compositions.

21. (Original)

The fill nipple of claim 19 wherein said one of the ends is defined in part by a flange portion extending radially outwardly from the passage and presents at least a portion of the inner surface for attachment to the shell.

22. (New)

The fuel tank of claim 9 wherein the shell includes an outer layer and an inner layer, and the inner layer of the fill nipple is attached to the outer layer of the shell and the cover is attached to the outer layer of the fill nipple and the outer layer of the shell.

23. (New)

A fuel tank, comprising:

a shell defining an interior for holding fuel and having an opening for receiving fuel into the interior;

a fill nipple having an outer surface and an inner surface defining a passage extending between a pair of generally opposed ends of the fill nipple with one end at least partially overlapped with and attached to the shell with the passage aligned with the opening allowing fuel to flow through the passage and into the cavity, the fill nipple has an inner layer of material forming the inner surface of the fill nipple, an outer layer of material forming the outer surface of the fill nipple, and a vapor barrier layer between the inner and outer layers, wherein the vapor barrier layer overlies the fuel tank along the entire extent of the overlap of the fill nipple and shell providing two vapor barrier layers along the entire extent of the overlap of the fill nipple and shell.

24. (New)

The fuel tank of claim 22 wherein the end of the fill nipple not attached to the shell is constructed and arranged to carry at least a portion of two separate fuel system components.

25. (New)

The fuel tank of claim 22 wherein said one end includes a radially inwardly extending flange and said another end includes a radially outwardly extending flange.